

# SQUID DISSECTION

## BACKGROUND INFO:

The squid is one of the most highly developed invertebrates. It is in the phylum Mollusca, which is derived from the Latin word meaning "soft body". It belongs to the class Cephalopoda, meaning "head-footed", because its head is pushed down toward the foot. This class also includes the octopus, cuttlefish and ancient nautilus.

All mollusks have a soft body with a special covering called the mantle, which encloses all of the body organs such as heart, stomach and gills. Squid have a large mantle, eight arms with two longer feeding tentacles all with suckers, a beak and mouth, a siphon, a large head (with a brain), two large eyes, and three hearts. The tentacles are long and retractable and have suckers only at the tips. Their large eyes are very similar in structure to people's eyes. The shell has been reduced to a chitinous pen that is embedded in the upper surface of the mantle. Squid breathe using gills. They move by squirting water from the mantle through the siphon, using a type of movement called jet propulsion. They can move both backward and forward just by changing the direction of the water flow through siphon.

Some of the animal's structures explored in this lesson illustrate the ways in which the squid has adapted to life in the ocean. Its streamlined body and jet propulsion make the squid a fast, active predator. This animal also has a very good defense mechanism.

Squid can change the color of their skin to mimic their environment and hide from predators. When in danger, squid release a cloud of dark ink from their ink sac in order to confuse their attacker and allow the squid to escape.

These fast-moving carnivores catch prey with their two feeding tentacles, then hold the prey with the eight arms and bite it into small pieces using a parrot-like beak. The esophagus runs through the brain, so the food must be in small pieces before swallowing. Squid feed on small crustaceans, fish, marine worms, and even their own kind!

Squid reproduce sexually by releasing eggs into the water. After mating, a female squid will produce 10-50 elongated egg strings, which contain hundreds of eggs in each string. In many species, the parents will soon die after leaving the spawning ground. The egg strings are attached to the ocean floor, are left to develop on their own, and hatch approximately ten days later.

Squid are an important part of the ocean food web. Squid are a major food source for many fishes, birds and marine mammals. Squid are gaining popularity as a food source for humans around the world (calamari). However, over-fishing is a growing concern because there are no regulations on squid harvesting.

Squid can be as small as a thumbnail, or as large as a house. The giant squid, *Architeuthis*, can measure 60 ft. in length and weigh three tons! Southern California squid populations spawn mainly in the winter (December to March). Squid are seined commercially at their spawning grounds. About 6,000 metric tons are taken yearly for human food and bait.

## SQUID DISSECTION DIRECTIONS

### MATERIALS:

1) Dissecting plate      3) Scissors      5) Paper towels 2) Probe      4) Squid

### PROCEDURE:

#### Part I – External Anatomy:

- 1) Place the squid on the plate dorsal side up (darker side). Notice the counter shading. One side is darker than the other.
- 2) Notice and label on the squid diagram the chromatophores. The “freckles” allow the squid to change colors. These spots change size to change the squid’s color for camouflage. Try rubbing them to see if you can see a change.
- 3) Look and label the fins. These help squid change direction when swimming.
- 4) Locate and label the mantle. The mantle is the main part of the squid’s body—all organs are inside.
- 5) Locate and label the pen. To remove the pen turn the squid so that the head is facing towards you dorsal side up. Flip the head backwards so as it is resting on the mantle. Underneath the head there is a hard, “plastic” looking line this is the pen. Loosen it from the skin using your scissors, it will pop up a bit. Grab the tip with your fingers, have a group member hold the mantle tightly, and pull on the pen, it should slide out. The squid is related to other “shelled” animals like clams and snails. The pen is all that is left of the shell the squids ancestors once had.
- 6) Look and label the eyes on the squid diagram. To remove the lenses of the eyes cut the eye gently with the scissors. The eye humor is brown and should leak out. Feel the eye for a hard small ball. This is the lens try to remove it from the eye. Squid have big eyes compared to their head. In comparison, humans’ eyes would be the size of dinner plates if the proportion were the same. They are positioned on the side. Being on the side gives them more peripheral vision, which is great for hunting.
- 7) Count and label the number of tentacles squid have. The tentacles are longer than the arms and have suction cups only at the tips. These are used to pass food to the shorter arms and then to the mouth.

- 8) Count and label the number of arms a squid have. Arms have suction cups all the way down. Label the suction cups as well on the diagram. The suction cups help the squid to hold onto food.
- 9) Hold your squid like a flower, let the arms lay back so you can see the mouth. You will be able to see the buccal bulb. To remove the buccal bulb, grip around the bulb tightly. Pull trying to slide your fingers around the back of the bulb. Do not pull too hard because we want the esophagus to remain intact. The buccal bulb attaches to esophagus, which is attached to the stomach. Draw the buccal bulb in on the internal anatomy squid diagram and label it.
- 10) Look and try to find the beak. The beak is hard and is a dark brownish color. Draw the beak in on the internal anatomy squid diagram and label it. To remove the beak press gently down on the buccal bulb. The beak is in two pieces and will start to pop out a bit, grip it with your fingers and pull it out the rest of the way.
- 11) Now, lay your squid ventral side up (lighter side). Locate the collar. The collar is the opening of the mantle (like the collar of your shirt).
- 12) Locate and label the siphon (a.k.a. funnel). You can label the siphon on the internal anatomy diagram. Water is pulled into the mantle. Mantle is squeezed forcing water out through the siphon. This type of movement is called jet propulsion. Squids are the fastest invertebrates swimming at approx. 30 mph.

## Part II - Internal Anatomy

- 1) Place the squid on the ventral side (lighter side). Cut the mantle UPWARDS to avoid puncturing internal organs. Cut all the way to the tip of the tail. Lay the flaps of mantle to the sides.
- 2) Label and remove the gills from the body (place them on the side of the plate). The gills are feathery structures that absorb oxygen from the water. Place them in a small beaker of water to see them inflate. Notice how in water the gills look feathery. This feature increases the amount of surface area potential for gas exchange.
- 3) Locate and label the ink sac. The ink sac lies on top of the liver. Carefully, pull it up with the tip of your scissors or finger and snip the ink sac away. Lay aside for now. The squid releases ink from this gland in times of danger, which is then pushed through the siphon.
- 4) Locate and label the heart. Squid have 3 hearts - 2 branchial and one systemic. The hearts are located at the bottom of the gills. The heart is for blood circulation.

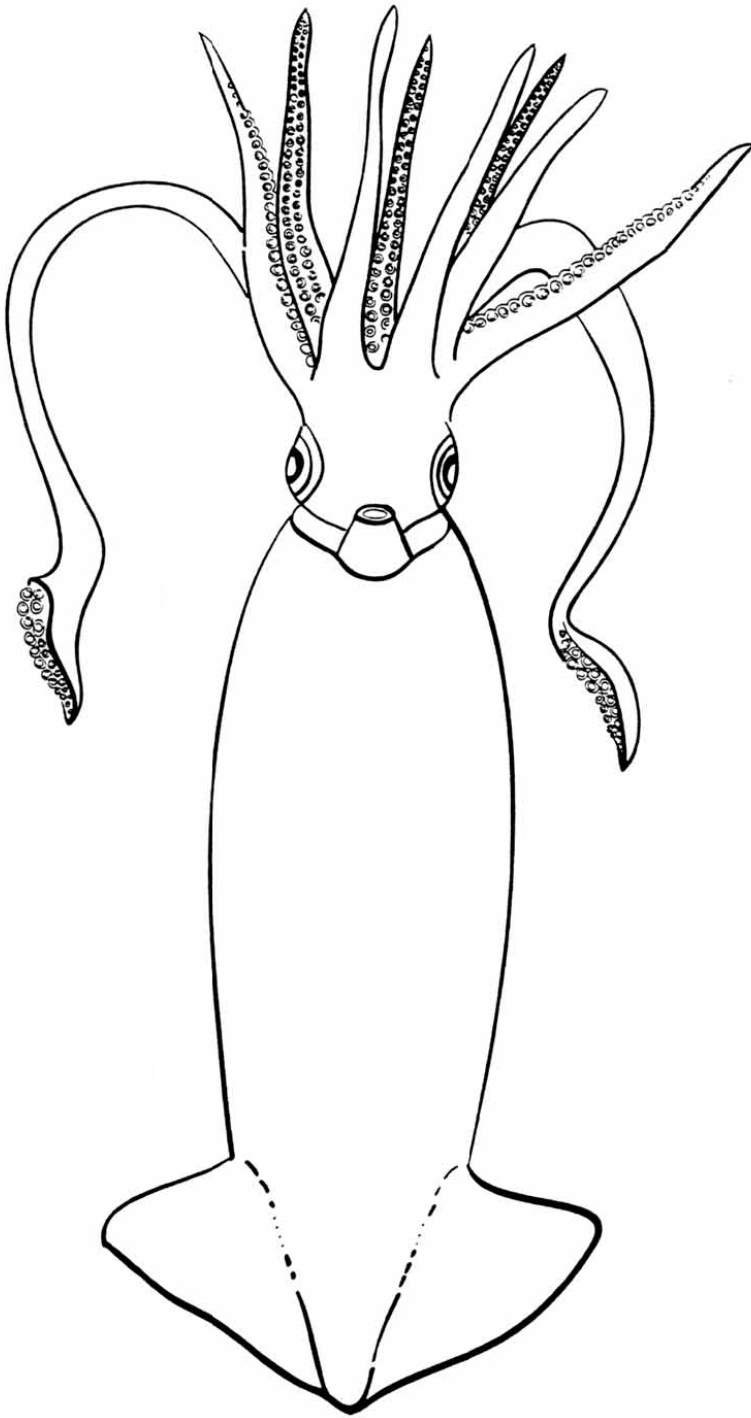
- 5) Locate the buccal bulb again. Try pulling on it gently to show the trail of the esophagus and general area of the stomach, the stomach area will twitch when pulled.
- 6) Locate and label the gonads. This is the reproductive organ. In males, it is a white-ish mound (sperm sac). In females, it is clear to yellow/orange mass of eggs. These might be hard to determine do your best.
- 7) Finally, take the pen and dip it into the ink sac. Then write your name on the white paper where you labeled your removed organs.

Be sure that by the end of the dissection you have removed the following organs, placed them on white paper and labeled them...

Eye: just the lens  
1 Arms and 1 Tentacles  
Label the Suction Cups on the arm and tentacle  
Pen  
Heart  
Beak  
Buccal Bulb with intestine attached and labeled  
Gills  
Ink sac with group members names written with pen for fun!  
Siphon

Also be sure to draw the structures into the blank outlines provided when the lab sheet asks you to. Remember that you will be teaching the class all about sea stars and should make sure to take pictures, and draw a diagram where you think it will be appropriate. The teacher will make copies of the diagrams/information you feel is important to distribute to the class.

## EXTERNAL SQUID ANATOMY



## INTERNAL SQUID ANATOMY

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